MARCHS POND

2018 SAMPLING HIGHLIGHTS

Station 1 Deep

New Durham, NH

Water quality data displayed in Tables 1 and 2 are surface water measurements with the exception of the dissolved oxygen data that were collected near the lake bottom.

Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Gray = No Data

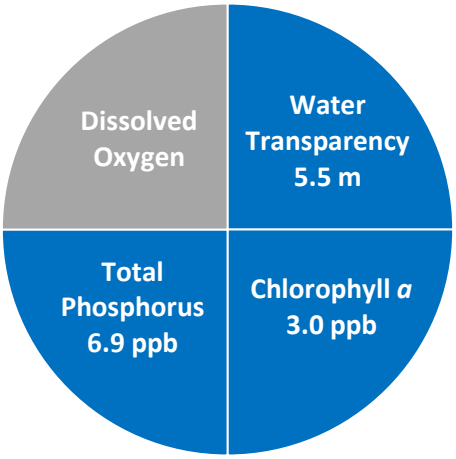


Figure 1. Marchs Pond Water Quality (2018)

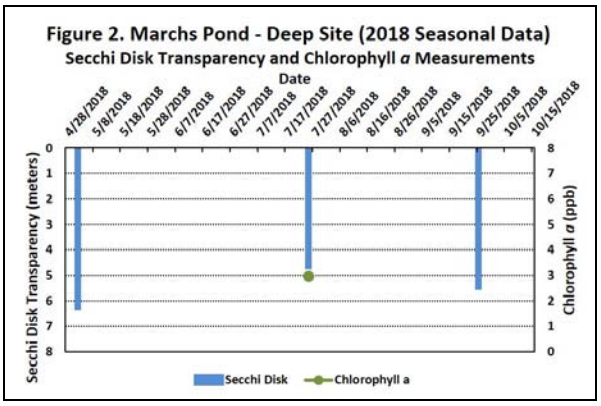
Table 1. 2018 Marchs Pond Seasonal Averages and NH DES Aquatic Life Nutrient Criteria[1]

Parameter	Oligotrophic "Excellent"	Mesotrophic "Fair"	Eutrophic "Poor"	Marchs Pond Average (range)	Marchs Pond Classification
Water Clarity (meters)	4.0 – 7.0	2.5 - 4.0	< 2.5	5.5 meters (4.7 – 6.3) *	Oligotrophic
Chlorophyll *a* [1] (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	3.0 ppb (single value)	Oligotrophic
Total Phosphorus [1] (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	6.9 ppb (4.7 – 8.8)	Oligotrophic
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	<2.0	No Data **	Not Assessed

* Secchi Disk was intermittently visible on the lake bottom and thus likely underestimates water clarity.
**Marchs Pond did not develop a deep water layer that is the basis for the dissolved oxygen classification criteria.

Table 2. 2018 Marchs Pond Seasonal Average Accessory Water Quality Measurements

Parameter	Assessment Criteria					Marchs Pond Average (range)	Marchs Pond Classification
Color (color units)	< 10 uncolored	10 – 20 slightly colored	20 – 40 lightly tea colored	40 – 80 tea colored	> 80 highly colored	9.8 color units (single value)	Uncolored
Alkalinity (mg/L)	< 0.0 acidified	0.1 – 2.0 extremely vulnerable	2.1 – 10 moderately vulnerable	10.1 – 25.0 low vulnerability	> 25.0 not vulnerable	4.6 mg/L (range: 4.5 – 4.6)	Moderately vulnerable
pH (std units)	< 5.5 suboptimal for successful growth and reproduction		6.5 – 9.0 optimal range for fish growth and reproduction			6.9 standard units (range: 6.9 – 7.0)	Optimal range for fish growth and reproduction
Specific Conductivity (*u*S/cm)	< 50 *u*S/cm Characteristic of minimally impacted NH lakes		50-100 *u*S/cm Lakes with some human influence	> 100 *u*S/cm Characteristic of lakes experiencing human disturbances		89.3 *u*S/cm (range: 87.7 – 90.9)	Characteristic of lakes with some human influence



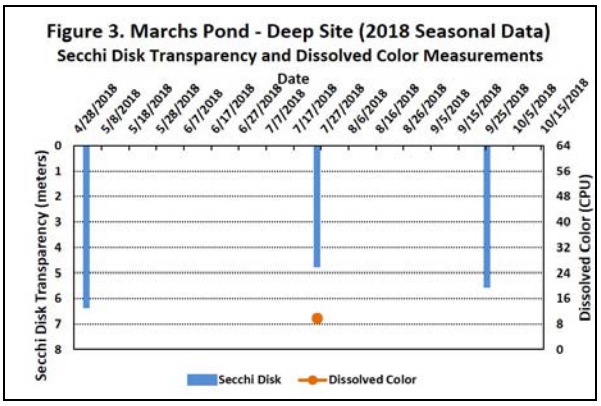
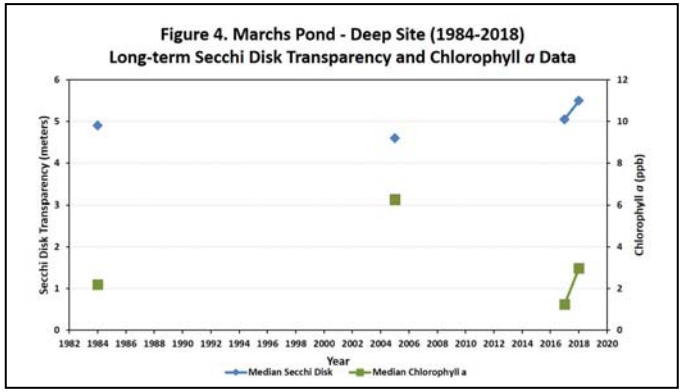


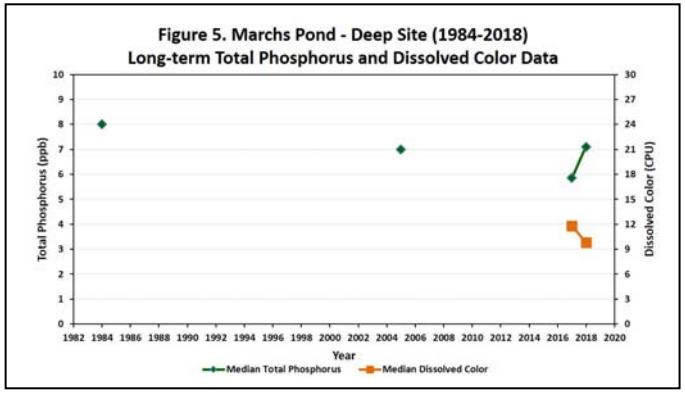
Figure 2 and 3. Seasonal Secchi disk transparency, chlorophyll *a* changes and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll *a* and dissolved color. Shallower water transparency measurements oftentimes correspond to increases in chlorophyll *a* and/or color concentrations.

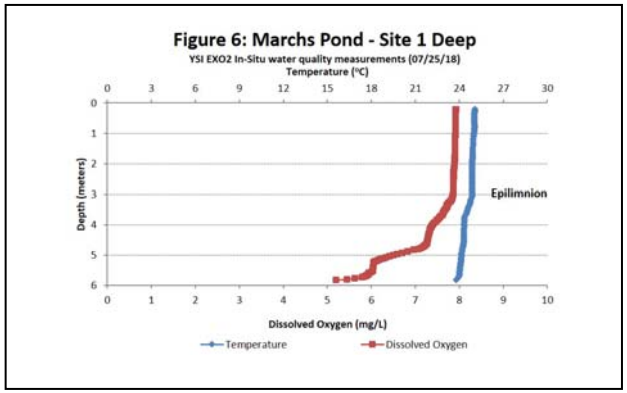
Table 3. New Durham Ponds inter-comparison (2018 Data)

Lake	Average (range) Secchi Disk Transparency (meters)	Average (range) Chlorophyll *a* (ppb)	Average (range) Total Phosphorus (ppb)	Average (range) Dissolved Color (CPU)	Average (range) Dissolved Oxygen (mg/l)
Merrymeeting Lake	10.8 meters (range: 8.6 – 12.1)	0.6 *u*g/l (range: 0.3 – 0.9)	3.4 *u*g/l (range: 2.0 – 5.2)	4.6 CPU (range: 2.7 – 6.3)	11.1 mg/l (range: 8.1 – 13.1)
Marsh Pond	3.4 meters (range: 2.5 – 5.2)	5.7 *u*g/l (range: 1.6 – 18.8)	28.2 *u*g/l (range: 14.1 – 46.8)	34.1 CPU (range: 19.3 – 72.4)	2.7 mg/l (range: 0.2 – 9.2)
Jones Pond	3.1 meters (range: 2.2 – 3.8)	8.0 *u*g/l (range: 1.9 – 17.2)	26.2 *u*g/l (range: 15.8 – 35.8)	40.4 CPU (range: 25.9 – 84.1)	0.3 mg/l (range: 0.1 – 0.6)
Downing Pond	3.0 meters (range: 2.7 – 3.3)	5.1 *u*g/l (range: 1.7 – 8.9)	24.6 *u*g/l (range: 16.0 – 34.3)	40.1 CPU (range: 29.5 – 74.2)	------
Chalk Pond	2.7 meters (range: 2.2 – 3.0)	0.9 *u*g/l (single value)	9.2 *u*g/l (range: 6.4 – 10.6)	10.7 CPU (single value)	------
Marchs Pond	5.5 meters (range: 4.7 – 6.3)	3.0 *u*g/l (single value)	6.9 *u*g/l (range: 4.7 – 8.8)	9.8 CPU (single value)	------
Shaws Pond	4.2 meters (range: 4.0 – 4.5)	2.6 *u*g/l (single value)	6.9 *u*g/l (range: 6.3 – 7.7)	22.4 CPU (single value)	6.3 mg/l (range: 5.0 – 7.5)

- Water quality data are reported for a deep reference sampling location in each lake/pond.
- Dissolved oxygen measurements were collected in the summer (late July and early August) in the bottom water layer (hypolimnion or metalimnion).
- Chalk, Marchs, and Downing Ponds Secchi Disk transparency measurements intermittently reached the lake bottom before disappearing from view and likely underestimate the water transparency.
- ------ Indicates the site is too shallow to form a stable deep water layer (hypolimnion or metalimnion) during the summer months.







Figures 4 and 5. Changes in the Marchs Pond water clarity (Secchi Disk depth), chlorophyll *a*, dissolved color and total phosphorus concentrations measured between 1984 and 2017. **Total phosphorus data are also displayed and are oftentimes correlated with the amount of plant growth.** Long-term trends are based on the analysis of annual median values

Figure 6. Marchs Pond profile of temperature and dissolved oxygen concentrations collected on July 25, 2018.

Recommendations

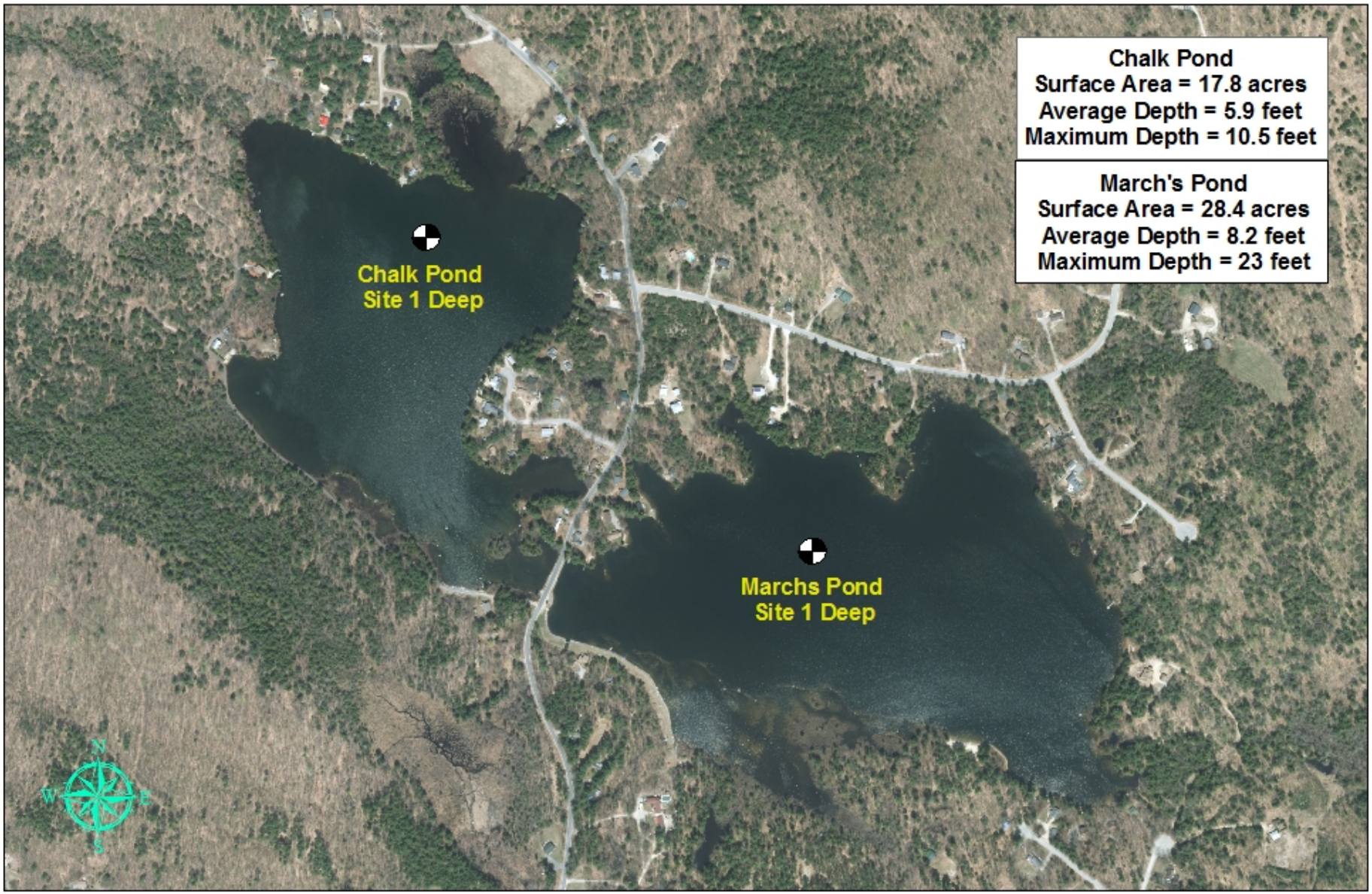
Implement Best Management Practices within the Marchs Pond watershed to minimize the adverse impacts of polluted runoff and erosion into Marchs Pond. Refer to "Landscaping at the Water's Edge: An Ecological Approach" and "New Hampshire Homeowner's Guide to Stormwater Management: Do-It-Yourself Stormwater Solutions for Your Home" for more information on how to reduce nutrient loading caused by overland run-off.

- https://extension.unh.edu/resources/files/Resource004159_Rep5940.pdf
- https://www.des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-11-11.pdf

Figure 7. Chalk Pond and Marchs Pond

New Durham, NH

2018 Deep water sampling sites



Aerial Orthophoto Source: NH GRANIT
GPS Coordinates collected by the UNH Center for Freshwater Biology

NH Extension